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THE subject of the origin and treatment of perityphlitic abscess has been largely dwelt upon within the last few years in the various medical societies in our principal cities, and notably quite recently by the leading physicians and surgeons in the important medical centres of Boston and Philadelphia. Though nothing specially novel can be presented in the following remarks, yet reiteration of the principal views in connection with this subject will be of importance, and especially so, it is thought, to the general practitioner. The latter will find, as his experience grows, that there are apparently two classes of perityphlitic abscesses, one of which progresses with few alarming symptoms, and develops into an abscess which either opens spontaneously, or which he, if he has recognized from the usual symptoms the presence of pus, opens with the knife, whereupon the patient, as a rule, promptly gets well. Again, a second form presents itself with more or less sharply marked symptoms of peritonitis, with the formation subsequently of a tumor in the region of the cæcum, which in due time, like the preceding one, resolves itself into an abscess. He may also meet cases in which a fulminating peritonitis destroys life in a few days. The consideration of this latter condition of affairs can, however, be laid aside for the present.

The practitioner will find it difficult to reconcile to himself that all three of these varieties have a common origin. If he consults his text-books he will learn that there are two distinct varieties therein spoken of. Some of these authorities he refers to will say that the inflammatory action is from the beginning in the connective tissue outside the peritoneal cavity behind the cæcum; and others that the inflammation has begun in the peritoneal cavity from

a lesion of the cæcum or appendix and has gained the connective tissue outside the peritoneum through a perforation of the adhesions gluing the visceral and parietal peritoneum together; and, finally, the latest works on this subject will tell him plainly and positively that the inflammation and abscess are from the beginning in the peritoneal cavity, and that the pus only approaches toward the surface by a natural destructive process common to abscesses generally. Among the most noted names that can be adduced in favor of these abscesses originating in the connective tissue posterior to the cæcum, are those of Bamberger, who, in 1853, stated that this view was a correct one, though he admitted that the peritoneum might be secondarily involved and so give rise to a circumscribed or general peritonitis. Oppolzer likewise, in 1863, remarked that perityphlitis meant an extra-peritoneal inflammation of the connective tissue behind the cæcum; he, however, also said that it was difficult to differentiate the diagnosis between the abscess thus resulting and that coming from ulceration and perforation of the appendix vermiciformis.

It is hardly worth while to go further into a citation of the various writers who have supported these different views concerning the cause of a perityphlitic abscess. The recent articles of Fitz and others interested in the subject have amply demonstrated the incorrectness of the views of the observers first named. It is now clear to every one who has given attention to this subject that all these abscesses originate in an inflammation, simple or gangrenous, or in a perforation, and more commonly it is the latter, of the appendix vermiciformis.

That the abscess might be due to a perforation of the cæcum is conceded, though such perforations are found at post-mortem examinations to be commonly caused by an abscess opening into the bowel or to necrotic ulceration from an over-distended colon due probably to a stricture further down the intestinal tube. Cæcal perforations of any kind are, however, very rarely met with.

While this prominent fact of the inflammation or perforation of the appendix as a cause of perityphlitic abscess has now been admitted by most surgeons, yet not a few still cling to the belief that the perforation takes place in such a way that an opening, small in size, is made directly from the appendix through the parietal peritoneum into the subperitoneal connective tissue behind the cæcum. Two serious objections have been raised to this belief. The first

objection comes from the recent observations of Mr. Treves in respect to the peritoneal covering of the appendix and cæcum itself. It is now the common property of the profession, through this surgeon's dissections, that these two parts of the intestinal tract are entirely covered by peritoneum. This is not a new discovery by Mr. Treves. He has only proclaimed it loudly and at a most opportune time.

Bardeleben, in 1849,¹ from an examination of one hundred and sixty cadavers, asserted as a certainty that the cæcum is completely surrounded by peritoneum, and lies so freely movable in the peritoneal cavity that it can be pushed upward and laterally. He, moreover, said at this early period that it follows, if this is corroborated, that the definition of a perityphlitis as an inflammation of the connective tissue of the posterior surface of the cæcum cannot be justified.

Luschka,² the distinguished anatomist, in 1861, declared that in the foetus the peritoneum surrounds entirely the cæcum and appendix, and that this is a usual thing, and is, as a regular rule, to be found in post-foetal life. Moreover, Luschka states that one cannot open the cæcum and appendix without opening the general peritoneal cavity; and he, too, remarks that perityphlitis, as it was then commonly regarded, was an impossible condition, unless there had been previous adhesions.

Corroboration of these views has been made by Dr. Richardson, of Boston,³ and I have myself in thirty autopsies had the position of the cæcum and appendix carefully observed by Dr. Ferguson, pathologist to the New York Hospital. His report is to the effect that the cæcum and appendix were covered entirely by peritoneum in twenty-eight instances, the cæcum only partially covered in one instance, and it was not stated in another. It may be mentioned as a matter of some interest in this connection that in sixteen of the cases the appendix rested beneath and posterior to the cæcum. Treves has found this to occur in eighteen per cent. of the cases observed by him.

While ranging myself with those who strongly believe in the

¹ Ueber der Lage des Blinddarms beim Menschen. Arch. f. Patholog. Anatomie u. Physiologie, Bd. ii. S. 583, 1849.

² Ueber der peritoneale Umhüllung des Blinddarms. Arch. f. Path. Anat. u. Physiol., Bd. xxi. S. 285, 1861.

³ Boston Med. and Surg. Journ., February, 1888.

origin of these abscesses in an inflammation or perforation of the appendix vermiciformis, yet I must confess from the clinical standpoint it is rather a difficult matter to prove this. Out of an experience of twenty-six abscesses of this sort that have been opened by me, in only some eight of them have I been able to recognize that the inner wall of the abscess was made up of loops of intestine bound together by adhesions. This experience has come to me, however, only within the last three or four years. I believe had I fairly tested this question in my earlier cases this number would have been increased, but it must be clear to every one that it is a test that cannot be applied with much thoroughness on account of the possible risks connected therewith. In fact, I do not advise that the matter should be determined in this way. I have elsewhere demurred to such explorations, or even to washing out the cavity of the abscess after it has been opened, with liquids, plain or medicated, lest the limiting adhesions of the peritoneal boundaries of the abscess should be damaged, and the patient's safety jeopardized. I believe, moreover, and this my observation confirms, that in many cases it is utterly impossible after the abscess is opened, and it is explored gently and judiciously by the finger, that the surgeon can determine whether the abscess is external to or within the peritoneal cavity. I do not think that evidence of a negative character thus obtained is worth anything at all in settling this question.

I have, therefore, been led to see if a solution could be arrived at by considering a large number of autopsies of this affection. I have taken pains to gather indiscriminately from the *Index Medicus* 100 cases of perityphlitic abscess, where an autopsy has been obtained, and on analyzing these reports have obtained the following result. Out of a total of 100 autopsies, I found that the appendix was perforated 84 times; that it was inflamed and not perforated 3 times; that the cæcum was perforated 4 times, 2 of which were due to ulcerations proceeding from without inward—in other words, from abscesses opening into the cæcum; and in 9 cases the condition of the cæcum and appendix was not stated.

As to the site of the abscess, which was an important fact to be ascertained in these 100 autopsies, 22 of them showed intra-peritoneal circumscribed abscesses; 13 intra-peritoneal abscesses and general peritonitis; 57 general peritonitis without abscess; and in but 4

instances was there an extra-peritoneal abscess; in 10 the condition was not stated.

Now this is a very strong point in favor of the propositions with which I have started: first, that these abscesses are invariably due to inflammation or perforation of the appendix vermiciformis; and second, that, as a rule, the abscess itself is developed within the peritoneal cavity. Not only out of the 100 cases were there only 4 extra-parietal abscesses, showing the rarity of this form of abscess, but also it is to be remarked that in all of these 4 cases there was a *large* communication between the intra- and extra-peritoneal portions of the abscess. Putting it in a different shape, it can be said that in no instance out of the 100 autopsies did there exist the gluing together of the appendix with the parietal peritoneum, and a primary escape of the contents (fecal or otherwise) of the appendix into the connective tissue by boring through this adhesion, and by the subsequent development of pus in the extra-peritoneal tissues.

There was another fact developed in connection with the examination of this collection of autopsies which must be of great importance to the physician, for he it is who sees the cases in their inception. It is this: that in only one case was the cæcum more than ordinarily filled with feces. Now, if there is anything else that is more firmly fixed than another in the practitioner's mind it is this: that the majority of troubles in this region are due to an accumulation of feces in the cæcum, and it is a rule almost prevalent in the medical profession that a purgative should initiate the treatment of these cases. It must be conceded that if it be correct, or if it be presumably correct, that the inflammatory conditions are most likely to originate from a perforation of the appendix, then this fact of itself should preclude the administration of a purgative —of even an enema; and much more would this direction become an absolute one when it is now taken into consideration how rarely stercoral accumulations are met with in this affection. Even catarrhal conditions as factors in the disease are scouted at by Treves.

The facts presented by With are likewise very convincing in this direction. This observer presented, in 1880, a series of 30 cases treated in their beginning by himself, or by his colleagues, after the ordinary method, with the result of 40 per cent. of deaths. In 1884 he again¹ reported a series of 50 additional cases similarly

¹ La Péritonite appendiculaire. Copenhagen, 1884.

met with, of which only 16 per cent. died. His treatment, however, was entirely different. Purgatives, rectal injections, etc., were sedulously avoided, opium was administered as soon as the disease was encountered, and the patient immobilized as far as practicable, urination and defecation being accomplished with the greatest care and freedom from motion. I can confirm myself, in two instances, the good results of this strenuous treatment instituted in the very beginning of the disease; that is to say, when it may be inferred that the perforation is about to occur or has just taken place.

With these facts in hand, the way is before us to appreciate the proper treatment for these apparently varying affections. Indeed, the aim of this paper, and the aim, I take it, of all the papers entertaining this view that have been published in recent years, is to force upon the mind of the profession, both medical and surgical, the important fact of the *origin* of this disease, because, as With himself states, with this kept constantly in view a proper treatment is more likely to be followed; either the medical one of immobilization, or, if this should prove of no avail, that the surgeon should stand, knife in hand, ready to use his instrument as occasion may demand.

I do not intend by this picture to give rise to the idea that in every case surgical interference should be immediately resorted to. I have learned by experience that many cases of moderate severity do not go beyond the stage of plastic exudation and subside without abscess; also, that some few abscesses disappear by a presumed opening into the bowel—not always to be proved. I know that delay may be safely resorted to, from the progress of some of the twenty-six cases of operations which have occurred under my own charge, wherein a comparatively late incision was made. This occurred in nearly all of them, not, however, from my own choice, but because they were either hospital cases that came late under my observation, or they were seen in consultation in private practice after the disease had already existed some time. In this number of cases only one death occurred, and that from an abscess of tubercular origin and in a phthisical patient in the last stages of his disease. Yet though all these, save that one, recovered, a good many of them had a very narrow escape from death by reason of the extensive suppuration, or the threatened sepsis that followed the retention of pus in a large, irregular cavity, or, in some cases, by the prolonged fecal discharge.

I do not know that the lateness of operation influenced this latter point much. Still, the statistics afforded by Noyes, quoted elsewhere,¹ bear out the conclusion that the earlier the safely progressing or subacute abscesses are opened, the better are the chances of the patient. Out of 100 cases Noyes found that in 88 operated upon after the eighth day 17 per cent. died, and of 12 operated upon before the eighth day, 8½ per cent. only died. There is also a risk that the patients carrying these slowly progressing abscesses are exposed to, and it is that the abscess itself may burst into the peritoneal cavity. In 67 cases collected by Dr. Bull, 8 burst into the general peritoneal cavity; and in 12 collected by With, 6 terminated in the same way. It will be remembered that, of the 100 autopsies cited above, in 13 of them there was a limited abscess associated with general peritonitis. The latter was believed, in many of these cases, to be due to a giving way of the soft adhesions circumscribing the original abscess. Furthermore, there are the risks of portal phlebitis, with external or internal suppuration of the liver, and pyæmia to be encountered the longer the pus is retained within the system.

Therefore the rule has been laid down, and in my judgment it is a wise one, here as elsewhere in the body, that as soon as pus is recognized it should be evacuated. Whether a surgeon should resort to measures for determining the presence of pus, such as the use of the aspirating needle or the making of an exploratory incision, will in any given case depend upon the condition presented by the patient. In other words, if the disease be acutely progressing, the surgeon will at once be called on to decide whether the patient will incur most danger from the progress of the disease or from operative interference.

In the case of a slowly progressing tumor without any or with slight peritoneal symptoms, or with those which may have passed away, or ameliorated within twenty-four hours, one need not always feel obliged to hasten to determine whether pus is present or not. The likelihood of there being simply some exudative fibrinous process is quite as great. I have myself been accustomed to keep such patients under careful observation for three or four days, and bide my time until some elevation of temperature, some chill or sweat-

¹ A Plea for Earlier Operation in Perityphlitic Abscess. Weir: Medical Record, June 11, 1887.

ing, or some increase in the size of the tumor indicates that more than such an exudation is present.

I am sometimes compelled to take this course in the earlier days of attacks of this sort, even when unwilling to do so, by the wishes of relatives, or by that more commanding objection, the reluctance, positively expressed, of the attending physician to consent to the employing of surgical measures. I have so far not been able in these milder cases to operate earlier than the fourth day, though my inclination leads me more and more to diminish the period of delay. In those cases, however, where there are decided symptoms of peritoneal involvement over a considerable area, and after such marked symptoms have had a duration of twenty-four hours without any subsidence and are associated with the concomitant symptoms of vomiting and elevation of temperature, then I believe we are justified in interfering without further delay, whether a tumor be present or not. If a tumor, however, does exist, then the question of the advisability of aspiration may be raised, and if decided on this may afford another evidence of the necessity for an immediate operation.

The value of this means of exploration is more commonly realized in those cases where the disease has existed more than forty-eight hours. The needle is usually introduced at a point just over the site of the appendix—that is to say, almost an inch and a half above and nearly the same distance inside of the anterior superior spinous process—and is then carried backward or downward toward the appendix; or it may be thrust inward, and somewhat downward at a point just above the middle of the crest of the ilium, hoping in this latter direction to detect an abscess that may run upward in the right dorsal gutter, and which is erroneously spoken of as being extra-peritoneal in character or of a peri-nephritic location.¹

I may insert here (as it has previously been omitted) in this connection, that in the one hundred autopsies referred to in the early part of this paper there were seven instances where abscesses had formed in this region, *all within the peritoneal cavity*, and that in two of them purulent matter had advanced as far as the posterior part of the liver, being limited internally by adherent intestines. Individually I believe that the abscesses of perityphilitic origin which

¹ A case (read as this proof is corrected) has recently been reported by Coupland in the British Medical Journal, March 23d, where a perityphilitic lesion had caused a subdiaphragmatic abscess.

are here found are located primarily, if not during the whole course, in the peritoneal cavity.

Concerning the usefulness of aspiration it must always be kept in mind that, while its employment may reveal the existence of pus, a failure to draw this out through the needle does not prove that pus is not there. Its use, moreover, is attended by some slight risk. When employing it in cases where a tumor was only suspected or could not be clearly and definitely made out, the thought has often come up to my mind that the point of the needle might perhaps perforate a distended bowel. This probably is not of any great matter unless the distention exists to a considerable degree, but the possibility of its doing damage to a normally situated or to a displaced iliac vessel, vein or artery, has often occurred to me. In order to avoid the risk of an extravasation of fetid pus that may come on from this exploration, into the peritoneal cavity, or along the track of the needle through the muscular tissue of the abdominal wall (the occurrence of which I have demonstrated in two instances), I prefer always to follow the revelation of the presence of pus by the needle by making the required incision at once.

I think in our present status that it will go without saying that in those instances in which there are signs of spreading or purulent peritonitis (even though no tumor is recognized in the iliac fossa, either by the ordinary examination or with the patient under anaesthesia) immediate laparotomy is demanded from the nature of the case, provided the general condition of the patient is not too much weakened by the practitioner's delay.

In the first-named variety of abscesses—the milder form of the disease—the incision can, as a rule, be made over the most prominent portion of the tumor; or, in general terms, parallel to Poupart's ligament and running along its outer part and the anterior portion of the crest of the ilium. If the abscess runs further backward the incision is carried in that direction also. In some few instances, as in the surgical treatment of a supposed circumrenal or hepatic abscess, the incision must be made vertically or obliquely in the space between the crest of the ilium and the ribs, or in the subdiaphragmatic form, along the ribs, or possibly through the pleural cavity itself. But in the ordinary cases where there are evidences of spreading peritonitis with or without the presence of a tumor, it is much better to make a tolerably extended incision along the outer half of the right rectus muscle, the upper end of which should reach

to the level of the umbilicus. After the muscular layers are divided the surgeon can readily recognize when he comes to the perineum. If the tumor is a large one, which is rare in the early stage of the disease, he may now see the evidences of œdema of the extra-peritoneal tissue, or even find the matter has broken down this membrane and has invaded the abdominal walls, but usually nothing is visible till the peritoneum is cut through, when one of three conditions may present itself.

First. A mass of œdematosus, opalescent exudation of varying thickness, sometimes half an inch or more in depth, may be observed. On cutting through this he may come down into an abscess cavity, large or small. This condition is likely to be found in the more slowly progressing troubles of the vermiform appendix, and it particularly belongs to those cases in which there have been previous and not very far distant attacks of appendical inflammation.

Second. The parietal peritoneum may be found normal, but perhaps adherent to the adjacent coils of intestines by a few recent adhesions. On gently pushing through these latter, if such exist, a firmer resistance may be encountered, and on boring through this with the point of the finger the cavity of the abscess is opened. If the parietal peritoneum and the adjacent intestines should be apparently free from adhesions, and yet an abscess be recognized by a tumor, though at some distance from the surface, it can be opened, and entered in the same manner by the finger. When this form of a more deeply located abscess is observed, it is wiser freely to enlarge the incision in the parietal peritoneum and to push away the interposing intestines, until warned by adhesions that the abscess is being approached, when the free peritoneal cavity can in a quite perfect manner be protected from the irritation of the pus that is about to be evacuated, by first packing the cavity with sponges or iodoform gauze; after this the abscess may be opened. I may, however, here remark that the septic influence of such pus on the adjacent intestines, in the cases that have come under my own care or observation, has been entirely absent, and this is contrary to what has been theoretically stated by those who oppose an early operation for the relief of these abscesses.

Third. There may, finally, be found on the immediately presenting loops of intestine next to the parietal peritoneum (or it may be encountered in the region of the cæcum), pus in moderate quantity and not encysted, or purulent lymph smeared over the intestines.

An exposure of the appendix, which is usually done in these cases, may show indubitably that it is the seat of the trouble, being either inflamed, perforated, or gangrenous; and the further exploration by means of a sponge on a long forceps carried into the pelvis or into the dorsal gutter of this side may reveal that we have to deal with a general suppurative peritonitis.

As a direction common to all of the above conditions save the last, it may be said that if the surgeon encounters a limited abscess and opens it, it is further treated simply by introducing a drainage-tube, or iodoform gauze, or both, and possibly by a partial closure of the abdominal wound and the usual antiseptic dressings.

I have already stated the objections to washing out or freely exploring such cavities. I can also see only danger in all the attempts that have been made by some to search for and to remove either the concretion that has produced the perforation or the perforated appendix itself. If the appendix should, however, be exposed and be readily accessible, it is proper to tie it off by a stout silk ligature. No fear need be entertained of a permanent intestinal fistula in any form of abscess, even where its contents smell strongly of feces, or even where there is a more or less decided flow of the contents of the bowel from the cavity for some time after the operation.

Furthermore, while not in a position to make the statement with positiveness, I have been strongly impressed in my investigations by the fact of the rarity of recurrence of perityphlitic abscesses that have been relieved by operation and where no interference with the appendix had been resorted to. This seems to support the advice just given, not to strive too zealously to get away the appendix. It is reasonable to suppose that the cicatrization of the perforation, occurring, as it usually does, in the upper part of this tube, obliterates its lumen so as to form a permanent safeguard against a recurrence of the disease.

ON GENERAL SUPPURATIVE PERITONITIS.—As has been stated, an exploratory operation, conducted in the manner just described, may reveal that the peritonitis has invaded the peritoneal cavity to an extent much wider than the iliac fossa. This spreading inflammation shows itself in two forms, to which I am disposed to attach some clinical difference in importance. One, with the ordinary lymph exudation, with occasional small depots of matter, or with moderate layers of liquid pus bathing sundry sparse coils of intes-

tines, with its focus of intensity in the right iliac fossa. This form is often associated with both completely and incompletely circumscribed abscesses. And in another form, where there is comparatively a scanty amount of plastic exudation, and where the intestines are bathed over a great extent with a thin layer of pus, which, however, is but seldom encysted, and in which pus is found in considerable quantities in the pelvis or along the dorsal gutters.

This latter form is, to my mind, the most intense, most fulminating, and most septic form of the disease, and is frequently met without any attempt at a circumscribed abscess, or, if so associated, the latter is small and has early burst its barriers. Prior to operation this kind of peritonitis can sometimes be recognized by puncturing through the abdominal wall with a hypodermatic needle in other places than in the right iliac fossa, or by a hypogastric puncture made deep in the pelvis, the bladder being first emptied. Whether these differences in inflammatory action, the result of a perforation of the appendix, are due or not to the amount of fecal or gaseous extravasation that takes place, is somewhat difficult to determine, but the experiments of Pawlowsky¹ seem to support this view. This observer has found, experimentally, that in the peritonitis resulting from perforation of the intestine, a peculiar germ, called by him the bacillus peritonitidis, is usually found, and that cultures of this bacillus brought death, when injected into animals, in from twenty-four to seventy-two hours, with the production of a fibrinous, purulent peritonitis. Where the disease lingered a little longer the peritonitis was purely a suppurative one.

In 6 cases of suppurative peritonitis of a marked character, coming from a perforated appendix vermiciformis, and not included in the 26 previously referred to, that have been treated by me by laparotomy, in all was the lumen of the appendix sufficiently large —up to its origin in the cecum—to have permitted of a free escape of the irritating contents of the intestine. This patency of the appendix I cannot but think must have an influence on the severity of the disease. In health and in disease its lumen greatly varies. Kraft² has also suggested that differences of severity might be ascribed to variations in the mobility of the appendix ; that, for instance,

¹ Beiträge z. Aetiologie und Entstehungsweise der akuten Peritonitis. Centralblatt f. Chirurg., No. 48, 1887.

² Ueber die frühzeitige operative Behandlung der durch Perforation des Wurmfortsatzes hervorgerufenen Perityphlitis stereoralis. Samml. klin. Vorträge, No. 331.

where it was short, as with a scant mesentery, or was confined by some previous adhesions, a more limited inflammation might be expected. While some observers have advised for a recognized suppurative peritonitis that the treatment required should be carried out through the lateral exploratory incision, I have, in two instances where it was practised in this manner, found myself somewhat hampered by the limitations of this incision, and therefore prefer to make, in addition to the exploratory one, a median incision, believing that this more commanding section expedites the treatment and renders it more certain. The lateral incision can be subsequently utilized for drainage purposes and for the special treatment of the appendix itself.

The median incision is also to be advised from another standpoint which has lately come home to me. In two instances I have observed that though the sponge introduced in the pelvis drew out pus through the lateral exploratory incision, yet the further carrying out of the treatment of cleansing the abdomen, etc., showed that the general cavity had not been invaded throughout its whole extent until the surgical manipulations had been employed, and that, had a median incision been made, one might possibly have been able to recognize and evacuate these abscesses, of unusual size and with slight limiting adhesions, without exposing the patients either to the risk of infecting the only moderately damaged peritoneum above, or, what was more important, might have spared them the exhaustion consequent on the necessity of a prolonged toilet of the abdominal cavity. Hence, it has now become my rule, after the resort to the lateral exploratory incision has demonstrated that no collection of matter is here present, and that the symptoms there or elsewhere found point to a possible invasion of the general peritoneal cavity, to resort to a median incision opening into the cavity rather high up, and carefully to enlarge it downward as may be required. Such abscesses can sometimes be recognized and treated per rectum, which, therefore, should always be examined in a case of perityphlitis or any form of peritonitis.

If, after all, a veritable general suppurative peritonitis be encountered, we have one of the most discouraging lesions in the whole of surgery to treat. Whether we resort to the sponging out of the pelvic cavity or dorsal gutters, a very exhausting procedure, or whether this cleansing is effected by repeatedly filling the peritoneal cavity with boiled water, or with a solution of salicylic acid

1 : 1000, or other non-poisonous antiseptic solutions, or whether it be accomplished by the less irritating means of irrigation with one or two glass tubes carried down to the bottom of the abdominal cavity in various directions, according to Tait's suggestion, and however thoroughly, however quick this end may be accomplished, and however satisfactorily we may place our drainage tubes, say one in the pelvis, one out through the lateral incision down to the stump left by the removed appendix, the difficulties of the case are but half encountered.

No delay need be made in this part of the operation, or, indeed, under any circumstances, by endeavoring, after cutting off the appendix, to cover the remaining end by peritoneum, as Treves has suggested. Surgical experience is sufficiently great, here as well as in the removal of the gall-bladder and in ovariotomy, to show that this is unnecessary. Granted that the patient's strength, already wasted by the disease, enables him to tide over the shock of an operation of this character, there remain after the closure of the wound dangers which thus far our surgical art has not yet learned to overcome.

Out of twenty-five cases of this description of general peritonitis arising from perforation of the appendix vermiciformis, but one has, so far as I have been able to learn, been saved. Two doubtful cases¹ have been recently classed in this catalogue, but a closer reading of their histories seems to point more toward the spreading exudative form of peritonitis with a circumscribed abscess than to the true suppurative type; but even these should be considered as triumphs of surgery.

In my own six cases of laparotomy for this disease in its well-marked form, death ensued in every instance, either from the shock of the operation—that is to say, within twelve hours thereafter—or from the persistence of the symptom which exists nearly always before the operation—I mean fecal or fecaloid vomiting, the matters vomited being always of a yellowish or creamy-brown color, but not always having a fecal odor attached to them; a condition which, beginning as the ordinary green bilious vomiting, thence changing to the above character has been so frequently proved to me by autopsy in connection with intestinal stenosis where no peritonitis existed as to convince me that its significance is always that of ob-

¹ Those reported by Drs. Sands and Jacobus.

struction, though it is true this obstruction may be caused by peritonitis. This obstructive symptom is due, as the interesting investigation of Malcolm¹ has shown, to paralysis of the muscular coat of the bowel occurring from the overstimulation of the nerveplexus of Auerbach which supplies it. Operative procedures of themselves sometimes occasion this paralysis, but septic influences are the most potent causes.

Sometimes obstruction is produced by the pressure of the distended coils on an adjacent part of the bowel.² This has been found not rarely in post-mortem examinations. Irregular contractions of the bowel due to septic irritation of the muscular coat are also found. It is this absolute paralysis of the intestine which constitutes, in addition to the general poisoning of the system, the great danger in these cases. And while the success of the early use of purgatives in the lesser forms of obstruction after ordinary laparotomies has only confirmed Mr. Tait's eulogy of this method of treatment, yet in these marked septic forms of peritonitis his treatment utterly fails. It is the exception to succeed in bringing about purgation, use what you will, whether salines, mercurials, or the washing out of the stomach.

In the three of my cases wherein the duration of life after the operation was prolonged sufficiently to enable me to undertake the trial of every method to overcome the obstructive symptoms, nothing brought about a discharge from the bowel save in one instance, and in this to but a slight extent. Moreover, in one case, as a last resort, it seemed proper to me to open one angle of my abdominal wound and to draw out the first presenting distended loop of intestine, at that time shut off by adhesions from the general cavity, and open it. But a scanty amount of fluid feces came out of the artificial anus thus formed, and without any marked relief to the patient. Also in one of Duplay's cases a tube was introduced through the perforated appendix into the colon without any benefit resulting therefrom.

In the autopsy of all of these cases (and this remark is only of value in the three who lived beyond twenty-four hours) there was but very slight evidence of fresh peritonitis, yet the temperature

¹ The Condition and Management of the Intestine after Abdominal Section, considered in the light of physiological facts, by John D. Malcolm. Med.-Chir. Trans., vol. 81, 1888.

² Verchére: Septicémie Intestino-Peritonéale. Revue de Chirurgie, July, 1888.

had kept up so high throughout as to corroborate the belief that no matter how thoroughly one might wash or cleanse the peritoneum during the operation, much septic material must be left in the various patches of exudation or in the inaccessible nooks of this cavity, to perpetuate the infection raging in the general system.

I had been much struck with the remarkable results witnessed in the wards of Mr. Treves in the treatment of suppurating disease of the knee-joint, by continued aqueous irrigation for a period of nearly a month, with the effect of securing a perfectly movable articulation, and had determined, in the next case of suppurative peritonitis presenting itself to me, so to arrange an entering tube, lodged in the pelvis, and a smaller emergent one in the upper part of the abdominal cavity, as to conduct a continuous stream of boiled or salicylic water through these for a number of days, and thus to secure, at least for a moderate length of time, a hyperdistention of the cavity, and a thorough dilution of its poisonous contents.

This idea, I have already learned, has been put into effect by Penrose, of Philadelphia,¹ who used on one occasion two glass tubes placed in the pelvis, and one large tube running from the epigastrium to the lower angle of the abdominal incision. The irrigation was not, however, continuous, but the abdomen was flushed with warm water every two hours for twenty-four hours after the operation, with a successful issue to this case of suppurative peritonitis with gangrenous patches on the sigmoid flexure.

Greig Smith² and Wylie also announce that they have used this repeated peritoneal flushing with advantage. Clinically, however, it must be admitted that such hyperdistention of the peritoneal cavity and ablution of the intestines can be carried on but a short time, as experience with the ordinary drainage-tube shows how rapidly the general cavity is shut off by adhesions.

In concluding these remarks it must be again placed prominently forward, that though laparotomy for general peritonitis following perforation of the appendix has had most discouraging results, yet that in nearly every case in which it has been so performed the disease had existed, on the average, nearly three days, the shortest time being thirty hours. Pawlowsky's experiments, and my own operations and those of others, tell us that the delay is an all-important

¹ Intestinal Obstruction in its Surgical Aspects. Journ. Amer. Med. Association, July 14, 1888.

² Abdominal Surgery, 2d edition.

fatal factor in these cases. Where the agonizing pain that ushers in often mild as well as severe cases does not yield to opening and the vomiting does not cease, and particularly the temperature does not fall within twenty-four or, at the most, forty-eight hours, then promptness of surgical action is required. Much less time should be allowed if the pain spreads, and other symptoms aggravate in severity. The query is, whether the prospect of an early laparotomy is a better one than the chance of a limited abscess forming. The latter is not a large one. My own collection of autopsies shows that a patient has about twenty-five chances in a hundred in his favor.

I venture, therefore, in terminating this paper, to present the following conclusions, based on observations of 100 post-mortem examinations and from 32 personal operations for so-called perityphilitic abscesses :

I. That all such abscesses originate in the peritoneal cavity, and there develop to an appreciable size before invading extra-peritoneal tissues or viscera.

II. That as stercoral accumulations or cæcal perforations are so rarely met with as causes of perityphilitic tumor or abscess, they should not be considered from a clinical view in any given case.

III. That in an attack of perityphlitis originating, as it generally does, as a perforation, or as a gangrenous condition of the appendix vermiciformis, all use of purgatives or enemata is in the beginning of a case to be avoided, and the immobilization of the patient is to be insisted on, and aided, if necessary, by anodynes.

IV. That if a tumor be found, it be opened by a lateral incision as soon as symptoms, constitutional or local, indicate the formation of pus.

V. That if symptoms indicating an increase of the local peritonitis, such as the persistence of vomiting, spreading pain, abdominal resistance, and temperature elevation, continue, with or without the formation of tumor, for a period of forty-eight hours, the danger of the disease is greater than the proposed lateral or median laparotomy, which should then be immediately resorted to. In many instances even a less time should be afforded the consideration of the disease before operating.

VI. If a general peritonitis be suspected, corroboration can often be obtained by abdominal aspiration with a fine needle employed in places other than in the right iliac fossa, and particularly by a deep

hypogastric puncture into the pelvis, the bladder being first emptied. However, if left in doubt, it is better to operate.

VII. [*Sub judice.*] That if general suppurative peritonitis be found at a laparotomy, lateral or median, avoid too much handling of the intestines, and trust to either temporary irrigation with large glass tubes (Tait's), or, more rationally, to permanent or repeated irrigation and fluid distention of the abdominal cavity, as advocated by Greig Smith and by Penrose.

VIII. [*Sub judice.*] To meet the obstruction symptoms due to septic paralysis of the bowels, which often persists after a laparotomy for suppurative peritonitis, saline purgatives and repeated washing out of the stomach should be resorted to, even though vomiting be present to a marked degree. Enterotomy may also, in exceptional cases, be entertained.

